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[54] Title of the Invention: Disposable Diaper

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## SPECIFICATION

### 1. Title of the Invention

Disposable Diaper

### 2. Claims

1. A disposable diaper comprising an absorber of a two-layer structure in which two powdery polymers different from each other in gel strength and absorbing speed are made into separate layers so as to prevent the seeping back of absorbed urine (so-called wet-back) as well as accelerate urine absorption.

2. The disposable diaper according to claim 1, wherein an intermediate nonwoven is placed on the lower polymer layer to extend longitudinally in a lower portion.

### 3. Detailed Description of the Invention

[Field of Industrial Application]

The present invention relates to a disposable diaper comprising an absorber of a structure in which two polymers different from each other in absorbing speed and gel strength are made into two layers so that a user can have

the diaper on until the polymers are saturated.

[Prior Art and Problems to be Solved]

The absorbers currently employed for disposable diapers are exemplified by those of the absorbent paper lamination type, those of the fluff pulp type made by grinding pulp to form a layer of ground pulp, and those made by spreading one kind of powdery polymer between such fluff pulp layers. Recently, the diapers utilizing a powdery polymer are widely available because of improved qualities and reduced costs of powdery polymers. An absorber of the absorbent paper lamination type readily allows indeed the absorbed urine to diffuse but is liable to be saturated due to its absorbent capacity which is only 7 to 8 times its own weight. An absorber comprising fluff pulp alone has an absorbent capacity of a little bit more than 10 times its own weight. This type of absorber, however, hardly allows a diffusion of the absorbed urine so that the area of the absorber where the urine has been absorbed is felt sticky. In the case of an absorber made by spreading one powdery polymer on fluff pulp, a large amount of urine can be absorbed before saturation because the polymer in itself has a urine absorbent capacity of a little bit less than 50 times its own weight.

At the same time, such an absorber also has problems. When a wearer of a diaper with the above absorber discharges urine, the liquid is poured not on the entire diaper but on its partial area and absorbed there. On a polymer-characteristic basis, the absorber holds moisture in the relevant area for the time being and permits its diffusion into the surroundings after the area is saturated. The absorber will stick to the skin of the diaper wearer if pressed in its already saturated area, because the absorbed urine will then seep back. A sticky absorber is a matter of great discomfort to disposable diaper users, adult or infant, and it is desirable that the absorber of the diaper in use is always felt dry and as if it were not being applied to the skin.

[Means to Solve the Problems]

The present invention solves the above problem of a sticky absorber by spreading two kinds of powdery polymers on fluff pulp layers separately to form separate polymer layers on the fluff pulp layers.

As shown in Fig. 2, a first fluff pulp layer is initially formed, on which a powdery polymer with a high absorbing speed and a low gel strength is spread to form a first polymer layer. An intermediate nonwoven and a second

fluff pulp layer are sequentially placed on the first polymer layer before a powdery polymer with a low absorbing speed and a high gel strength is spread on the second fluff pulp layer to form a second polymer layer. A third fluff pulp layer is formed on the second polymer layer to thereby obtain an absorber. Subsequently, an impermeable polyethylene sheet is arranged under the first fluff pulp layer as a waterproof member, and a nonwoven made of polyester, polypropylene, rayon or the like is placed over the third fluff pulp as a coverstock. Gathers are formed on both lateral sides of the nonwoven, which is then bonded to the polyethylene sheet at both lateral ends using a hot-melt adhesive. Finally, fastening tapes are provided to complete the disposable diaper.

The urine penetrating through the coverstock nonwoven reaches the second polymer layer by passing through the third fluff pulp. Since the second polymer layer has a low absorbing speed, the urine further passes through the second fluff pulp to the first polymer layer by the influence of the pressure from the diaper wearer while longitudinally diffused by the intermediate nonwoven. The first powdery polymer, as having a high absorbing speed and a low gel strength, not only takes in the moisture of the urine rapidly but also holds in good time even the moisture

staying back in the intermediate nonwoven. Once the first polymer layer is saturated after repeated arrivals of urine, the pressure from the diaper wearer causes the urine in the first polymer layer to come up to the second fluff pulp layer in a diffused manner by inversely passing through the intermediate nonwoven. Then in the second polymer layer, the powdery polymer with a low absorbing speed but a high gel strength can hold the urine slowly coming up and prevent the urine from coming up further into the third fluff pulp layer. As a consequence, the coverstock nonwoven is always felt dry. The present invention is now described with reference to the following Examples exclusively concerning an absorber.

#### Example 1

On 200 g/m<sup>2</sup> of a fluff pulp, a polymer having a gel strength of 4 to 5 dyne/cm and an absorbing speed of about three seconds is uniformly spread in an amount of 90 g/m<sup>2</sup> and overlaid with 200 g/m<sup>2</sup> of the fluff pulp to produce an absorber. The absorber is examined for liability to wet-back (moisture return).

#### Example 2

Following the procedure of Example 1 except that the

polymer is replaced by a powdery polymer having a gel strength of 5 to 6 dyne/cm and an absorbing speed of four to five seconds, an absorber is produced and its liability to wet-back is examined.

### Example 3

On 200 g/m<sup>2</sup> of the fluff pulp, 45 g/m<sup>2</sup> of the powdery polymer used in Example 1 is spread and 15 g/m<sup>2</sup> of a linty, dry-type nonwoven is placed thereon as an intermediate nonwoven. The nonwoven is overlaid with 200 g/m<sup>2</sup> of the fluff pulp, on which the powdery polymer used in Example 2 is uniformly spread and overlaid also with 200 g/m<sup>2</sup> of the fluff pulp to produce an absorber. The absorber is examined for liability to wet-back.

### Method of Testing the Liability to Wet-Back (Moisture Return)

Onto the middle of a specimen, 100 cc of 1% saline is quickly poured and the specimen is left to stand for three minutes. Subsequently, five sheets of filter paper weighed in advance are put on the specimen and on the sheets in themselves is placed a weight of 7 kg for a minute. The weight of the saline that has transferred to the five sheets of filter paper is then measured.

The smaller the measured value is, the lower the liability to moisture return is.

#### Results

Example 1	15.7 g
Example 2	13.4 g
Example 3	2.5 g

The results show that the use of two kinds of powdery polymers can decrease the liability to wet-back even though the total polymer weight is the same.

#### 4. Brief Description of the Drawings

Fig. 1 is a perspective view of the disposable diaper of the present invention, and Fig. 2 is a cross section of the diaper according to the present invention, in which reference numeral 1 designates the coverstock nonwoven, 2 the third fluff pulp, 3 the second polymer layer, 4 the second fluff pulp, 5 the intermediate nonwoven, 6 the first polymer layer, 7 the first fluff pulp, 8 the waterproof polyethylene sheet, and reference numeral 9 designates the gathers.



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⑮ 発明の名称 使い捨ておむつ

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## 明 細 書

## 1. 発明の名称

使い捨ておむつ

## 2. 特許請求の範囲

1 使い捨ておむつの吸収体において、ゲル強度及び吸収速度の異なるポリマー粉を別々の2層となし尿の吸収を早くするとともに逆もれをなくした(いわゆるウェットバック性)ポリマーの2層構造を有する吸収体を使用した使い捨ておむつ。

2 下層ポリマーの上に中間不織布をのせ下部で前後方向に拡がりをもたせた特許請求の範囲第1項記載の使い捨ておむつ。

## 3. 発明の詳細な説明

〔産業上の利用分野〕

本発明は使い捨ておむつの吸収体において使用者がポリマーの飽和状態まで使用出来るように吸収速度、ゲル強度の異なるポリマーを2層となした構造を有する吸収体を使用した使い捨ておむつに関するものである。

## 〔従来の技術及び問題点〕

現在使い捨ておむつに使用されている吸収体としては吸収紙の積層タイプ、バルブを粉砕して層状にした綿状バルブタイプ及びその綿状バルブの間に一種類のポリマー<sup>粉</sup>を散布したもの等があり最近ではポリマー粉の品質の向上<sup>と</sup>コストの低下によりポリマー粉を使用したおむつが多く出まわっている。吸収紙の積層タイプは尿の拡がりがあるが自重の7~8倍しか吸収能力がなくすぐに飽和状態となる。綿状バルブのみを使用したものは自重の約10倍強の吸収力があるが拡がりがない為尿を吸収した部分はべとつく。又、綿状バルブに1種類のポリマーを散布したものはポリマー粉自体、自重の約50倍弱の尿吸収能力を有しているため飽和状態になるまでにはかなりの量の尿が吸収される。

しかしながらこのおむつを装着している状態では尿はおむつ全体にかからなく、1ヶ所のみ放尿されポリマーの特性としてその部分のみで水分をかかえ込み飽和状態になつてからその周囲に拡

がつていくのであるが最初吸収された部分では飽和状態となつてゐるため押さえると逆もれし肌へべとつく。おむつ使用者あるいは使用児にとつてべとつく事は非常に不快感があり、常にさらつとして着用していく使用感がないことがのぞましい。

#### 〔問題解決の手段〕

本発明はべとつきを解消するため2種類のポリマー粉でもつて別々の層を作り綿状パルプ層上に散布したものである。

第2図のように最初第1綿状パルプ層を作り、その上に第1ポリマー層として吸収速度が早く、ゲル強度の少ないポリマー粉を散布し中間不織布をのせ、第2綿状パルプ層を置き第2ポリマー層として吸収速度が遅くゲル強度の強いポリマー粉を散布した後第3綿状パルプ層をその上に重ねて吸収体となし、第1綿状パルプ層の下に防水部として不透水性のポリエチレンシートを敷き第3綿状パルプの上部にはポリエステル、ポリプロピレン、あるいはレーヨン等よりなる不織布を表面シートとして置き両側にギャザー部を作り両側端を

ホットメルト接着剤で止めテープをつけてなる使い捨ておむつとした。

表面不織布より吸収された尿は第3綿状パルプを通り第2ポリマー層へ行くが吸収速度が遅いため使用者の着用圧で第2綿状パルプを通過して中間不織布にて前後に拡散され第1ポリマー層へ行く。第1ポリマー粉は吸収速度が早くゲル強度が弱い為尿中の水分を早く取り込んでしまい、なおかつ中間不織布についている水分までもかかえ込む。次から次に尿が第1ポリマー層へ来て飽和状態になると着用圧により逆に中間不織布を通して第2綿状パルプ層へ尿が拡散された状態で上がっていく。第2ポリマー層には吸収速度が遅いがゲル強度の強いポリマー粉があるのでゆつくり上つて来た尿をかかえ込み第3綿状パルプ層へ持ちあげない為表面の不織布は常にサラットしている。以下吸収体のみを取り出した本発明の実施例を説明する。

#### 実施例1

200<sup>g</sup>/<sub>m<sup>2</sup></sub>の綿状パルプを置き、ゲル強度

4.5 dyne/cm、吸収速度約3秒のポリマー90<sup>g</sup>/<sub>m<sup>2</sup></sub>を均一に散布し200<sup>g</sup>/<sub>m<sup>2</sup></sub>の綿状パルプを重ねて吸収体としたもののウエットバック性(逆もどり性)を調べる。

#### 実施例2

実施例1のポリマー粉をゲル強度5~6 dyne/cm、吸収速度4~5秒の物を使用し、ウエットバック性を調べる。

#### 実施例3

200<sup>g</sup>/<sub>m<sup>2</sup></sub>の綿状パルプの上に実施例1で使<sup>45<sup>g</sup>/<sub>m<sup>2</sup></sub></sup>用したポリマー粉を散布し中間不織布としてケバ立ちのある15<sup>g</sup>/<sub>m<sup>2</sup></sub>の乾式不織布をのせ、200<sup>g</sup>/<sub>m<sup>2</sup></sub>の綿状パルプを重ねその上へ実施例2で使用しているポリマー粉を均一に散布した後同じく200<sup>g</sup>/<sub>m<sup>2</sup></sub>の綿状パルプを置いて吸収体となしウエットバック性を調べる。

#### ウエットバック性(逆もどり性)のテスト方法

1g食塩水1000ccを試験体中央部にさつとかけ3分間放置した後重量測定したワッパ5枚を置き7gのおもりを1分間のせた後ワッパ5枚に

移項した食塩水の重量を測定する。

数値が少ない方が逆もどりが少ない。

#### 結 果

実施例1 15.7g

実施例2 13.4g

実施例3 2.5g

以上のように同重量のポリマー粉でも2種類のポリマーを使用する事によりウエットバック性を良くする事が出来る。

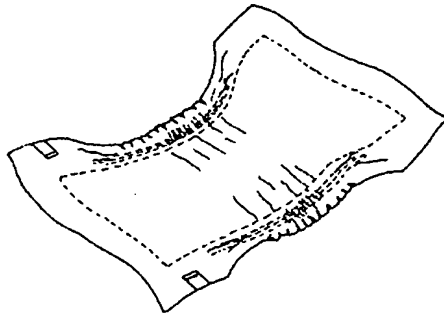
#### 4. 図面の簡単な説明

第1図は本発明の使い捨ておむつの斜視図、第2図は本発明におけるおむつの断面図、1は表面不織布、2は第3綿状パルプ、3は第2ポリマー層、4は第2綿状パルプ、5は中間不織布、6は第1ポリマー層、7は第1綿状パルプ、8は防水用ポリエチレンシート、9はギャザー部である。

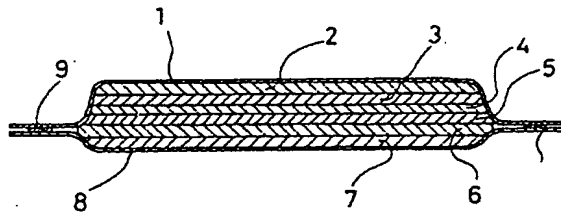
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第 1 図



第 2 図



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